THE CLAIMS

What is claimed is:

1. A method of manufacturing a wafer which comprises:

annealing a heterogeneous material compound that includes a donor substrate of a first material and having a thin layer extending from one face to a weakened zone, with the thin layer bonded to a receiver substrate of a second material that is different from the first material, the annealing conducted at a temperature and for a time less than that sufficient to cause detachment of the thin layer from the donor substrate; and

irradiating the annealed heterogeneous material compound with photons to obtain detachment of the thin layer from the donor substrate along the weakened zone.

2. The method of claim 1, wherein the annealing is performed at an energy of up to about 99% of that of a budget of thermal detachment at which the thin layer will detach from the donor substrate.

3. The method of claim 1, wherein the annealing is performed at an energy of about 70% to 99% of that of a budget of thermal detachment at which the thin layer will detach from the substrate.

4. The method of claim 1, wherein the photons are applied with a wavelength that is absorbable by the donor substrate or the receiver substrate.

5. The method of claim 4, wherein the wavelength of the photons is in the ultraviolet region of the spectrum.

6. The method of claim 1, wherein the irradiation is performed through the receiver substrate.

7. The method of claim 1 wherein the irradiation is performed through the donor substrate.

8. The method of claim 1, wherein the first material has a different coefficient of thermal expansion compared to the second material.

9. The method of claim 1, which further comprises applying a heat sink proximal to a portion of the heterogeneous material compound, the heat sink being applied to the substrate having the higher thermal expansion coefficient.

10. The method of claim 1 wherein the annealing and the irradiation are performed with the same device.

11. The method of claim 1 wherein the photons are selected from the group consisting of non-coherent light and laser light.

12. The method of claim 1 wherein the irradiation is provided two-dimensionally over a surface of the heterogeneous material compound.

13. The method of claim 1 wherein the photons are scanned over the heterogeneous material compound.

14. The method of claim 1 wherein the irradiation includes applying a thermal shock to the heterogeneous material compound to induce detachment.

15. The method of claim 1 wherein the heterogeneous material compound is cooled down to a temperature of about 18°C to 25°C between the annealing and the irradiation.

16. The method of claim 15 wherein the irradiation is performed while the heterogeneous material compound is cooled or after the heterogeneous material compound has been cooled to a temperature below a threshold temperature (T_{Thr}), wherein an undefined damage of the heterogeneous material compound can occur at the threshold temperature.

17. The method of claim 16, wherein the irradiation is performed with a Xenon lamp.

18. The method of claim 16, wherein the irradiation is performed with a Halogen lamp.

19. The method of claim 1, wherein a selective wavelength is applied by using an irradiation filter during the irradiation.

20. The method of claim 1, wherein a spectrum of wavelengths is applied by using an irradiation filter during the irradiation.

21. The method of claim 1, wherein the photons are pulsed as they are applied to the heterogeneous material compound.

22. The method of claim 1, wherein the photons are applied to an edge portion of the heterogeneous material compound.

23. The method of claim 1, wherein the photons are applied to a center portion of the heterogeneous material compound.

24. The method of claim 1, wherein the photons are applied to the entire heterogeneous material compound.